

In re Patent Application of
GARNIER ET AL.
Serial No. 09/499,060
Filed: February 4, 2000

B4
Cont

a voltage ramp generator comprising
a capacitance having a first resistance, and
a charging circuit connected to said
capacitance and comprising
a current generator, and
a degenerate current mirror circuit
connected to said current generator and to said
capacitance, said degenerate current mirror
circuit having a second resistance for
generating a capacitance charging current that
is proportional to a square of a ratio of the
second resistance and the first resistance; and
a third resistance connected to said voltage ramp
generator for generating a current ramp.

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Sub
D9

36. (Amended) A method for generating a ramp voltage
comprising the steps of:
generating a capacitance charging current using a
charging circuit comprising a current generator having a first
resistance and a circuit connected to the generator having a
second resistance for enabling the capacitance charging
current to be proportional to a square of a ratio of the
second resistance and the first resistance; and
charging a capacitance with the capacitance charging
current for generating the ramp voltage.

REMARKS

Applicants would like to thank the Examiner for the
thorough examination of the present application.

The Examiner objected to the claims as being
indefinite. In Claim 13, for example, the Examiner has taken

In re Patent Application of
GARNIER ET AL.
Serial No. 09/499,060
Filed: February 4, 2000

the position that there is no support in the specification for the "capacitance" being "a gate capacitance of a MOS transistor." Support is found in the specification on page 9, lines 9-11, which recites "To reduce the effect of component variations on the ramp, the capacitance C is the gate capacitance of a MOS transistor ...". Consequently, Claim 13 is definite. Claims 19, 27, 34 and 39 are similar to Claim 13, and were also rejected as being indefinite. Consequently, these claims are also definite.

In Claim 23, the Examiner has taken the position that there is no support in the specification for the "third resistance". Support is found in the specification on page 8, line 13, which recites "a resistance Rs". The resistance Rs is also illustrated in FIG. 3 as part of the conversion circuit. Consequently, Claim 23 is definite.

Claims 38 and 39 have been canceled to address the Examiner's rejection thereof. In addition, independent Claims 15 and 29 have been amended to more clearly define the present invention over the cited prior art references.

Independent Claims 9, 21 and 36 have been amended to more properly recite of "the second resistance." Instead of "comprising" these claims have been amended to recite "having." These particular claim amendments in now way narrow the claim scope for any reason related to the statutory requirements for patentability.

Attached hereto is a marked-up version of the changes made to the claims by the current amendment. The attached paper is captioned "Version With Markings to Show Changes Made."

The claim amendments and arguments supporting patentability of the claims are presented in detail below.

In re Patent Application of
GARNIER ET AL.
Serial No. 09/499,060
Filed: February 4, 2000

I. The Independent Claims Are Patentable Over Caron

The Examiner rejected independent Claims 9, 15, 21, 26 and 36 as being anticipated by the Caron patent. Caron discloses an electronic engine timing control circuit for an internal combustion engine.

The claimed invention, as recited in independent Claim 9, for example, is directed to a voltage ramp generator circuit comprising a capacitance, and a charging circuit connected to the capacitance. The charging circuit comprises a current generator having a first resistance, and a circuit connected to the current generator and to the capacitance having a second resistance and enabling a capacitance charging current to be proportional to a square of a ratio of the second resistance and the first resistance.

The presence of the second resistance advantageously permits compensation for a spread of the first resistance. The spread may be due to operating temperature changes, for example. Without the second resistance, the spread of the first resistance is reflected in variations of the capacitance charging current. In order to compensate for the spread of the first resistance, the second resistance is included. Consequently, the capacitance charging current can be controlled based upon the ratio of the second and first resistances. In particular, the capacitance charging current is proportional to a square of a ratio of the second resistance and the first resistance, as in the claimed invention.

Referring now more particularly to the Caron patent, a ramp generator **16** is illustrated in FIG. 4. The Examiner has taken the position that all of the elements of the claimed

In re Patent Application of
GARNIER ET AL.
Serial No. **09/499,060**
Filed: **February 4, 2000**

invention are illustrated in FIG. 4. Referring to column 7, lines 22-26 in Caron, which provides:

"An external variable resistor is intended to be connected between terminal P5 and ground and an external capacitor between terminal P6 and ground to provide for desired ramp characteristics." (Emphasis added.)

The external variable resistor, which is indicated by reference **80** in FIG. 4, is adjusted "to secure exact calibration of the signal V_{speed} to the frequency at which the ramp generator is being reset by the trigger signal at terminal P7. This compensates for capacitor tolerance variations." Column 7, lines 56-60.

The external capacitor **78** is charged by a charging current from a current mirror **102**. Referring to column 8, lines 15-28 in Caron, which provides:

"The magnitude of this charging current is determined by the magnitude of the V_{speed} signal and the resistance value of resistor **80**. ... Current mirror **102** in turn reflects a corresponding magnitude of charging current (i.e., mirrored current) for charging capacitor **78**. As the V_{speed} signal increases and decreases, the magnitude of the current through resistor **80** likewise increases and decreases. In turn, capacitor **78** charges more rapidly and more slowly." (Emphasis added.)

In other words, the capacitor charging current in Caron varies based upon a value of the variable resistor **80**, which is set to secure exact calibration of the signal V_{speed} to

In re Patent Application of
GARNIER ET AL.
Serial No. 09/499,060
Filed: February 4, 2000

the frequency at which the ramp generator is being reset. This is in sharp contrast to the claimed invention, which recites that the capacitance charging current is proportional to a square of a ratio of the second resistance and the first resistance.

Accordingly, it is submitted that independent Claim 9 is patentable over Caron. Independent Claims 21 and 36 are similar to independent Claim 9, and amended independent Claims 15 and 29 are similar to independent Claim 9, by reciting that the capacitance charging current is proportional to a square of a ratio of the second resistance and the first resistance.

II. The Independent Claims Are Patentable Over Tanigawa and the Applicants' Prior Art FIG. 1

The Examiner rejected independent Claims 9, 15, 21, 26 and 36 over the Tanigawa patent in view of the Applicants' prior art FIG. 1. The Examiner cited the Applicants' prior art FIG. 1 as disclosing a ramp generator having a current source Igl with no expressed teaching of the structure thereof. The Examiner cited Tanigawa as disclosing in FIG. 4 a current sink comprising "a current mirror" which has the advantage of gain control. The Examiner has taken the position that it would have been obvious to modify the current sink as disclosed in Tanigawa to a current source, and replace the current source Igl in the Applicants' prior art FIG. 1 with the modified current source.

As discussed above, the claimed invention, as recited in independent Claim 9, for example, is directed to a voltage ramp generator circuit comprising a capacitance, and a charging circuit connected to the capacitance. The charging circuit comprises a current generator having a first

In re Patent Application of
GARNIER ET AL.
Serial No. 09/499,060
Filed: February 4, 2000

resistance, and a circuit connected to the current generator and to the capacitance having a second resistance and enabling a capacitance charging current to be proportional to a square of a ratio of the second resistance and the first resistance.

Even if the references were combined as suggested by the Examiner, the claimed invention is not produced. The Applicants' prior art FIG. 1 and the Tanigawa patent both fail to teach or suggest that the capacitance charging current is proportional to a square of a ratio of the second resistance (from Tanigawa) and the first resistance (internal resistance of current source Igl), as recited in independent Claim 9, for example.

Moreover, there is no motivation or suggestion to take the current sink as disclosed in Tanigawa and modify it to a current source so that it may be combined with the voltage ramp generator circuit disclosed in the Applicants' prior art FIG. 1. It thus appears that the Examiner is using impermissible hindsight reconstruction to modify Tanigawa in view of the Applicants' prior art FIG. 1 to produce the claimed invention. The Applicants respectfully assert that obviousness cannot be established by combining the teachings of Tanigawa and the Applicants' prior art FIG. 1 to produce the claimed invention without some proper prior art teaching, suggestion or incentive supporting such a combination.

In other words, there must be some reason in the prior art why one of ordinary skill would have been prompted to combine the teachings of the references as suggested by the Examiner to arrive at the claimed invention. The prior art references, individually or in combination, do not teach or suggest that the capacitance charging current is proportional

In re Patent Application of
GARNIER ET AL.
Serial No. 09/499,060
Filed: February 4, 2000

to a square of a ratio of the second resistance and the first resistance.


Accordingly, it is submitted that independent Claim 9 is patentable over Tanigawa in view of the Applicants' prior art FIG. 1. Independent Claims 21 and 36 are similar to independent Claim 9, and amended independent Claims 15 and 29 are similar to independent Claim 9, by also reciting that the capacitance charging current is proportional to a square of a ratio of the second resistance and the first resistance.

In view of the patentability of the independent claims as discussed above, it is submitted that their dependent claims, which recite yet further distinguishing features, are also patentable over the prior art. Thus, these dependent claims require no further discussion herein.

CONCLUSION

In view of the amendments and the arguments provided herein, it is submitted that all the claims are patentable. Accordingly, a Notice of Allowance is requested in due course. Should any minor informalities need to be addressed, the Examiner is encouraged to contact the undersigned attorney at the telephone number listed below.

Respectfully submitted,



MICHAEL W. TAYLOR
Reg. No. 43,182
Allen, Dyer, Doppelt, Milbrath
& Gilchrist, P.A.
255 S. Orange Avenue, Suite 1401
Post Office Box 3791
Orlando, Florida 32802
407/841-2330

In re Patent Application of
GARNIER ET AL.
Serial No. 09/499,060
Filed: February 4, 2000

VERSION WITH MARKINGS TO SHOW CHANGES MADE

In the Claims:

The claims have been amended as follows:

9. (Amended) A voltage ramp generator comprising:
a capacitance; and
a charging circuit connected to said capacitance and
comprising

a current generator having a first resistance,
and

a circuit connected to said current generator
and to said capacitance [comprising] having a second
resistance and enabling a capacitance charging
current to be proportional to a square of a ratio of
the second resistance and the first resistance.

15. (Amended) A voltage ramp generator comprising:
a capacitance; and
a charging circuit connected to said capacitance and
comprising

a current generator having a first resistance,
and

a degenerate current mirror circuit connected
to said current generator and to said capacitance,
said degenerate current mirror circuit having a
second resistance for generating a capacitance
charging current that is proportional to a square of
a ratio of the second resistance and the first
resistance.

Please cancel Claim 16.

In re Patent Application of

GARNIER ET AL.

Serial No. 09/499,060

Filed: February 4, 2000

21. (Amended) A current ramp generator comprising:
a voltage ramp generator comprising
 a capacitance, and
 a charging circuit connected to said
capacitance and comprising
 a current generator having a first
 resistance, and
 a circuit connected to said current
generator and to said capacitance [comprising]
 having a second resistance and enabling a
capacitance charging current to be proportional
to a square of a ratio of the second resistance
and the first resistance; and
a conversion circuit connected to said voltage ramp
generator for generating a current ramp.

29. (Amended) A current ramp generator comprising:
a voltage ramp generator comprising
 a capacitance having a first resistance, and
 a charging circuit connected to said
capacitance and comprising
 a current generator, and
 a degenerate current mirror circuit
connected to said current generator and to said
capacitance, said degenerate current mirror
circuit having a second resistance for
generating a capacitance charging current that
is proportional to a square of a ratio of the
second resistance and the first resistance; and
a third resistance connected to said voltage ramp
generator for generating a current ramp.

In re Patent Application of

GARNIER ET AL.

Serial No. **09/499,060**

Filed: **February 4, 2000**

Please cancel Claim 30.

36. (Amended) A method for generating a ramp voltage comprising the steps of:

generating a capacitance charging current using a charging circuit comprising a current generator having a first resistance and a circuit connected to the generator

[comprising] having a second resistance for enabling the capacitance charging current to be proportional to a square of a ratio of the second resistance and the first resistance; and

charging a capacitance with the capacitance charging current for generating the ramp voltage.

Please cancel Claims 38 and 39.

In re Patent Application of
GARNIER ET AL.
Serial No. **09/499,060**
Filed: **February 4, 2000**

CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: DIRECTOR, U.S. PATENT AND TRADEMARK OFFICE, WASHINGTON, D.C. 20231, on this 14 day of August, 2001.

Krista Dhanu